cc: SHANNON

Skipanon

CREST

Post Office Building, Room 202 P.O. Box 175, Astoria, Oregon 97103 (503) 325-0435

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RECEIVED
PORT OF ASTORIA

January 21, 1981

Mr. Richard W. Pearson, Director
Clatsop-Tillamook Intergovernmental Council
P.O. Box 488
Cannon Beach, Oregon 97110

Dear Dick;

Following are my comments on the proposed amendment to the City of Warrenton's Comprehensive Plan which would change land use designations on the east bank of the Skipanon River. The proposed amendment deletes approximately 95 acres of a 130 acre dredged material disposal site on the east bank (site 25(s)); approximately 35 acres would remain designated for disposal of dredged material from maintenance of the inner Skipanon Channel. It is my understanding that no sloughs or freshwater wetlands are contained in this 35 acre area. The amendment also deletes a 67 acre mitigation site 9(m) (see enclosed material).

Deleting 95 acres of the 130 acre Dredge Material Disposal site will probably not be a problem. The remaining 35 acres is adequate to meet at least 5, and possibly 20 years of dredge spoil needs associated with maintaining the inner Skipanon Channel (Steve Chesser, Corps of Engineers, personal communication); however, other dredging projects are anticipated by the CREST Plan to also use this site, including maintenance and expansion dredging of the Warrenton Boat/Turning Basin and development by the Warrenton Lumber Company.

Deleting mitigation site 9(m) could seriously affect future development on the east bank. This site was originally proposed for restoration to mitigate for impacts of developing an oil drilling rig fabrication facility on the east bank (Brown and Root). While this proposal is no longer valid, the Port of Astoria wishes to pursue an exception to Goal 16 (Estuarine Resources) to continue to designate for development 77 acres of intertidal marsh and flats. By deleting the mitigation site designation, the city will have greater difficulty justifying an exception.

Site 9(m) should be a particularly high priority mitigation site. Of all areas in the estuary, Youngs Bay has probably been most adversely impacted by diking and filling. Additionally, the Bay is one of the most biologically productive, supporting large numbers of Corophium salmonis, a primary food source for juvenile salmon.

In previous action, the City deleted mitigation site 10(m). Thus, the value of site 9(m), the sole remaining mitigation site in Young's Bay, is further underscored.

Roger Shannon, Acting Director of the Port of Astoria, has discussed with me the Port's intention to pursue an exception for 77 acres of aquatic development on the east bank. He is aware of the mitigation requirement, and has proposed that policy language be added which recognizes that only a portion of the 77 acre site will actually be developed. This would allow the Port to consider different development configurations within the 77 acres.

A mitigation area equal to the actual development area would be protected through comprehensive plan policy on the 130 acre shoreland area. For example, if it is agreed that 30% of the 77 acres would be developed, then approximately 23 acres of the 130 acre shoreland site would be protected for mitigation. This option would provide 130 acres of developable land; for each acre of intertidal lands developed, one acre of diked land could be restored to the estuary. If a water dependent industrial development were to be sited on the 130 acre shoreland site and not require mitigation (e.g., its access to the main channel was on pilings and did not require dredging intertidal areas), then the 77 acre exception would be deleted. Reserving mitigation options in this manner would give the Port needed flexibility to plan for different site configurations.

I hope to be working with you and Roger on this approach. I would recommend, therefore, that the City of Warrenton not take any action until we have a chance to devise a comprehensive program for developing the east bank and for providing needed mitigation sites.

Sincerely,

Michael D. DeLapa

Michael D. DeLapa
Director

Enclosure

cc: Bob Cortright, DLCD
Roger Shannon, Port of Astoria

42.06 MOUTH OF THE SKIPANON RIVER

General Description

This subarea contains the filled and diked shorelands north of Harbor Drive and east of Skipanon Drive, the Skipanon River from the Harbor Street Bridge to its mouth, and adjacent Columbia River waters out to the navigation channel. Parts of downtown Warrenton are also included. The subarea lies entirely within the present Warrenton city limits.

Aquatic Features

The mouth of the Skipanon River was originally low and marshy. The river channel has been widened and deepened and several tributary sloughs closed off. The Skipanon Peninsulas were created by fill during the late 1920's-1930's. These large fills have severed Alder Cove from Youngs Bay and caused the Skipanon River to empty into the main channel of the Columbia River, rather than into Youngs Bay. The Warrenton Mooring Basin was created from land by dredging. The aquatic features of Youngs Bay and Alder Cove have been described under 42.07 and 42.02, respectively.

The 8th Street dam effectively divides the Skipanon River into two bodies of water. Except during the winter months, fresh water flow in the Skipanon River is low (average flow 50 cfs), and Columbia River water and ocean water are the main water masses observed below the 8th Street dam. Salinity intrusion occurs here whenever salinity is present in the adjacent Columbia River waters. Despite the low fresh water flow, strong vertical differences in salinity occur during the fall, and bottom waters may become stagnant. Dissolved oxygen levels well below state and federal standards have been observed, but are probably infrequent and moderately high numbers of benthic organisms have been found in some areas. Inorganic sediments are largely of Columbia River origin. Near the mouth of the river, the sediments are largely clean sand. The proportion of fine material, organic matter and wood debris increases in the upriver direction. Anoxic bottom sediments occur in the developed area below the bridge. Flushing times and fish runs in the Skipanon River have been discussed under 42.05.

The shallow areas of sandy substrate north of the Skipanon River spits are similar to adjacent areas in Youngs Bay and Alder Cove. Such areas have low to moderate numbers of benthic organisms, but receive considerable usage by fish and large invertebrates, such as shrimp and crab. Deeper areas adjacent to the main navigation channel are less productive for bethos. These areas are described under 41.02.

The authorized navigation project in the Skipanon River is 30 feet deep and 200 feet wide from the Columbia River Channel to the railroad bridge and 6 feet deep and 40 feet wide for 4500 feet upstream from the railroad bridge. Also included is the 12 foot deep mooring basin and a 30 foot deep turning basin just north of the mooring basin. The channel above the bridge has never been dredged and the 8th Street dam precludes access to the last 0.3 miles of authorized channel. Since ocean going ships do not presently use the Skipanon River, the channel is maintained at a depth of between 14 and 20 feet by hopper dredge (disposal in-water at Tansy Point). Small amounts of material were removed in 1975 and 1979. Because the sediments near the bridges are highly organic and may contain toxic substances, dredging in this reach requires land or ocean disposal.

Included in this subarea are portions of the marshes and tide flats west and north of the west spit and east and north of the east spit. These marshes and tide flats are similar to other nearby flats and marshes in Youngs Bay and Alder Cove. Their characteristics are described under 42.07.

Shoreland Features

Most land in this subarea is agricultural (grazing) or developed (commercial and industrial). Soils are sandy fill or Coquille-Tidal Marsh (fresh) - Clatsop Association. All of this subarea east of the Skipanon River is in the floodplain, except for an area of fill part of the way out the east spit. Wildlife values are low to moderate.

Human Use

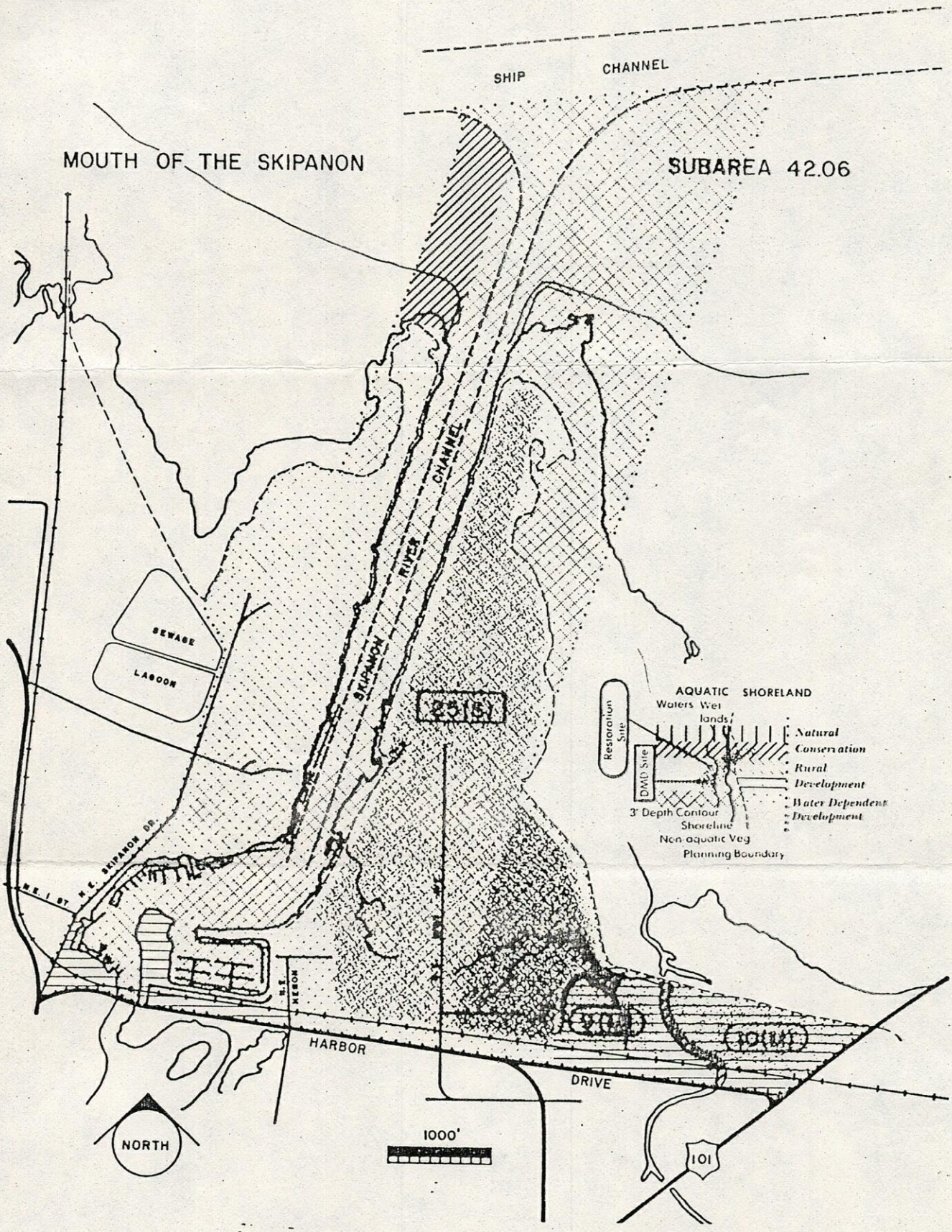
Commercial and industrial uses are dominant in this subarea. There is some grazing and a few houses along Harbor Drive. In addition to the Warrenton Mooring Basin, there are several other marinas, a charter boat operation, two fish processors that release wastes into the river, and one condominium complex with another under construction. Warrenton Lumber Company, the largest industry in the city, sorts logs in-water and stores them on both sides of the navigation channel. The only industry presently using the east spit is a cement plant. As befits the industrial nature of the area, ownership is largely Port, County or corporate. The agricultural value of the area is low and there is no commercial timber.

Highway access is provided by Harbor Drive and Skipanon Drive. The railroad runs along the southern border of this subarea. Access to both the Skipanon and Columbia Rivers is available from the spits. Access to the Columbia River has not been developed, however, and would require dredging, filling or piering out to deep water.

The marshes on Alder Cove and Youngs Bay adjacent to this parcel receive recreational use for hunting.

Issues and Findings

Land use planning for the mouth of the Skipanon River must come to terms with the direct and substantial conflicts between resource protection and industrial development. The area contains both industrial sites of great value and significant natural resource values. Both peninsulas of the Skipanon River are especially suitable for water dependent industry. There are sizeable parcels of vacant land in both public and corporate ownership. The adjacent Skipanon River has an authorized deep draft channel. The main navigation channel of the Columbia


MOUTH OF THE SKIPANON
SUBAREA 42.06
SHIP CHANNEL
SEWAGE LAGOON
SKIPANON RIVER CHANNEL
2515
AQUATIC SHORELAND
Waters
Wet lands
Restoration Site
DMD Site
3' Depth Contour
Shoreline
Non-aquatic Veg
Planning Boundary
Natural
Conservation
Rural
Development
Water Dependent Development
N.E. SKIPANON DR.
N.E. 1 ST
N.E. MERON
HARBOR
DRIVE
1000'
NORTH
101

River is immediately accessible. There is railroad access.

The three adjacent aquatic areas here contain important natural resource values (see Aquatic Features of 42.02, 42.06, and 42.07). Scientific studies have shown that both Alder Cove and Youngs Bay make significant contributions to the fisheries resource, particularly salmon.

The east peninsula of the Skipanon River has been intensively studied for its development potential and the impacts of development on natural resource values. In connection with a proposed oil rig fabrication facility on this, an environmental impact statement and a mitigation study have been completed.

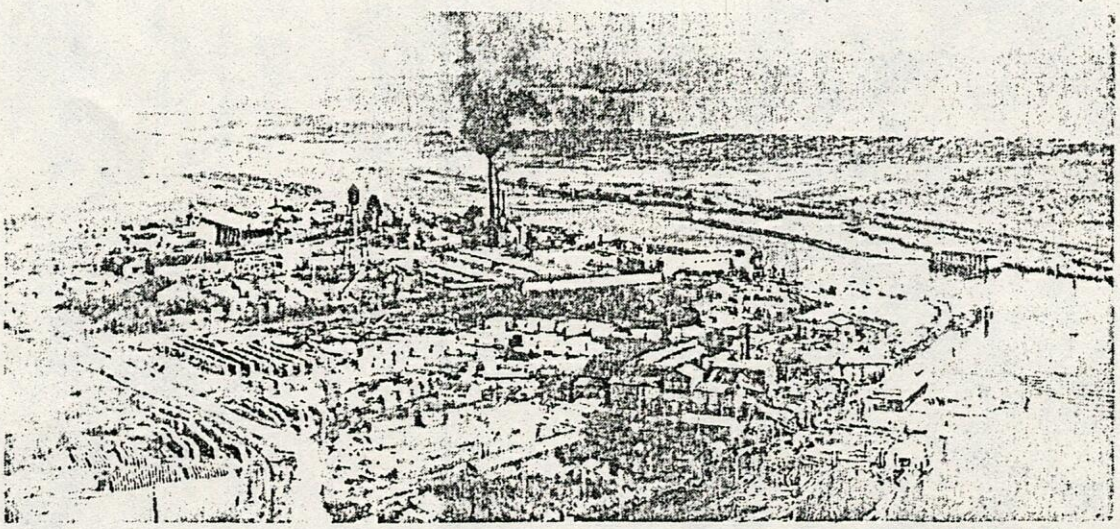
The west peninsula of the Skipanon River is presently occupied by Warrenton Lumber Company. This largest employer in the City of Warrenton has continued to make substantial investments in its facilities. The Company has expansion plans which would involve the development of a two-berth log and lumber shipping facility on the Skipanon River. At the present time the Company's products are moved by truck through downtown Warrenton to the Port of Astoria for shipment. Development of a ship loading facility on the Skipanon would result in substantial cost savings to the Company and would also bring about a reduction in truck traffic through downtown Warrenton.

A log and lumber loading facility requires approximately twenty acres of "back-up" area next to the ship berths. This area must be directly adjacent to the loading dock in order to avoid double handling of logs and lumber. Such double handling would not be economically feasible. A wide back-up area of shallow depth would be the most desirable since a larger number of logs can be stored closer to the vessels, thus reducing haul distances, equipment requirements and, consequently, costs. As a length of approximately 1500 feet would be required for berthing two ships, the twenty acre requirement would result in a depth of 580 feet for the back-up area.

The construction of a shipping facility and back-up area on the west peninsula would have some impact upon the valuable wetlands of Alder Cove. Locating the 580 x 1500' area immediately north of the present facilities would impact approximately 7.8 acres of marsh area. 4.2 acres would be below Mean High Water (MHW) and 3.6 acres would be above MHW. The total of 7.8 acres of 10.4% of the approximately 75 acres of marsh in Alder Cove. By locating the facility directly on the Harbor Line and as far south as possible, these figures represent the minimum possible impacts on Alder Cove.

Practical alternatives to construction of the log and lumber loading facility do not exist. The natural resource values of adjacent Alder Cove require that the facility be designed to minimize impacts on the Cove. Economics require that the facility be constructed immediately adjacent to the existing Company operations. The long-term economic viability of Warrenton's largest employer requires that the Company find an alternative to the costly transportation and double handling which result from the present practice of transporting products to Astoria for shipment. A log and lumber loading facility on the Skipanon adjacent to present operations with an adequate back-up area designed to minimize harmful effects on Alder Cove is the only feasible choice.

The west peninsula of the Skipanon River also has significant potential for extra deep draft access directly on the Columbia River. Natural 40' water depths occur about 1500' from the end of the peninsula. There is ample space for manuevering and docking large ships. The proximity of this site to the ocean and the excellent condition of the 40' channel downstream mean that the site is one of few locations where, by judicious use of tides, vessels drawing in excess of 40' could be accommodated. As such, the site could provide the required mooring capability for economically shipping or receiving liquid or dry bulks in vessel sizes significantly greater than those using other port sites on the Columbia River or in Oregon. Very few alternatives sites for extra deep draft shipping in bulk cargoes are available. The east bank of the Skipanon, a possible alternative, may be committed to other



- Port of Astoria Photo

uses. The Tansy Point area is an additional alternative but is subject to controversy over deed restrictions on important portions of the area.

An extra deep draft bulk shipping facility could be built on the west peninsula of the Skipanon without requiring any dredging or filling of shallow productive areas. Vacant back-up land is available west and north of the Warrenton sewer lagoons (see 42.03). An elevated conveyor-belt operation could be constructed on piling without making additional encroachments on Alder Cove.

The City of Warrenton has proposed a second mooring basin, just north of the present mooring basin, to be excavated from shorelands.

Further development in this subarea raises questions of water quality in the Skipanon River. Water quality in the Skipanon River is marginal during summer months. Would increased dredging, river traffic, storm runoff and boat moorage coupled with decreased flushing caused by enlarging the channel result in significantly poorer water quality?

There are also land and water traffic problems. The surface area of the Skipanon River is quite limited. How much can the small boat traffic be increased without causing congestion problems and interfering with industrial operations? Highway traffic congestion is already a problem in downtown Warrenton; more industrial development at the mouth of the Skipanon River may increase traffic congestion there and on U.S. Highway 101. Increased small boat moorage would also increase congestion and result in a need for additional parking spaces. Industrial and commercial development of these areas will also have a significant impact on truck and rail traffic through the City of Astoria, where congestion is already severe during much of the year.

Exceptions to the LCDC Estuarine Resources Goal, Number 16, are required for designation of aquatic areas west of the west Skipanon peninsula, at the Warrenton Lumber Company site, and east and north of the east Skipanon peninsula at the Brown and Root site. (cf Appendix B.)

Aquatic Designations

Below the Harbor Street Bridge, the Skipanon River out to the main Columbia River channel is designated ***Development***. Holbrook Slough and the west fork of Holbrook Slough are designated ***Conservation***. East of the east peninsula, the aquatic area which lies within 1500 feet of MHHW on the east shoreline of the Skipanon River and out to the main navigation channel is designated ***Development***. West of the west peninsula the aquatic area which lies within 580 feet of the Harbor Line on the west shoreline of the Skipanon River is designated ***Development*** north to MHW and ***Conservation*** from MHW out to the channel.

Shoreland Designations

The small peninsula directly to the west of the Warrenton Boat Basin which extends northward into the Skipanon River from the railroad track is designated ***Development***. To the east of this spit up to N.E. Heron, the land between the railroad tracks and Harbor Drive is ***Development***. The shoreland east of the west fork of Holbrook Slough is also designated ***Development***. The remaining shoreland in this subarea is designated ***Water Dependent Development***.

Subarea Policies

1. Development of shorelands and adjacent aquatic areas on the east and west peninsulas of the Skipanon River shall be carried out so as to minimize adverse environmental impacts on productive tidal marshes, mud-sand flats, wildlife, fisheries and other important natural values of Youngs Bay and Alder Cove. Site planning shall include provision for vegetative buffers and other means for shielding the developed areas from adjacent marshes and flats.

2. In the ***Water Dependent Development*** area on the west peninsula of the Skipanon River, existing and new uses which are associated with wood processing and handling shall be allowed.

3. The ***Development*** designations for aquatic areas along both sides of the Skipanon are provided to accommodate future water-dependent uses. However, the designations do not create the presumption that dredging, filling or other alterations will be permitted automatically. Specific proposals for water-dependent development must: be justified in terms of available alternatives, public need and economic benefits; minimize adverse impacts on water quality and natural habitat; and meet other requirements of the permit processes.

Dredged Material Disposal

In this subarea there is one dredged material disposal site located on the east bank of the Skipanon [25(S)]. This large site could be used for disposal of material associated with Skipanon River projects, construction of a second Warrenton Boat Basin or development on the Columbia River side of the peninsula. (cf Dredged Material Management Plan 57.50, 59.)

Restoration and Resource Enhancement

Two potential marsh mitigation sites are located in this subarea; one to the east of Holbrook Slough [10(M)]; and one to the west [9(M)]. Restoration to aquatic productivity would require construction of a new dike north of the railroad, breaching of the existing dikes and dredging necessary draining channels. (cf Restoration and Mitigation 65.)

Mitigation Needs

The proposed Pacific Fabricators, Inc. oil rig fabrication facility on the east peninsula of the Skipanon will impact about 118 acres of marshes and mud-sand flats for which the Division of State Lands will require mitigation. Other projects which might be proposed for this area would require mitigation for dredging or filling intertidal or tidal marsh areas. Restoration sites adjacent to the property east and west of Holbrook Slough should be considered for mitigation use, as well as sites up the Youngs or Lewis and Clark Rivers.

On the west bank of the Skipanon, the plan describes a potential project of Warrenton Lumber Company which may involve filling a small area of tidal marsh in Alder Cove. Such filling, if permitted, would require mitigation by restoring or creating another tidal marsh to compensate for the loss. Sites at Swash Lake (near the Columbia River mouth), on Youngs Bay, or up the Youngs or Lewis and Clark Rivers, should be considered as possible mitigation sites. (cf Restoration and Mitigation 66.30.)

24(S) - Shoreland **Priority 3**

Location Bounded on east by Kings Avenue, on south by S.E. 11th Street, on west by Skipanon Slough in Warrenton.
Size 70 acres
Capacity 1,120,000 cy at 10 feet
Ownership Private
Designation *Development*
Current Use Agriculture
Final Use Commercial and residential
Related Project Skipanon inner channel; Warrenton Boat/Turning Basin maintenance and expansion; 20' channel above bridge; Warrenton Lumber Company development.
Bio-Physical Description Flat; two minor drainages into Skipanon Slough; silty clay loams; diked on west; some residential development to north and northeast; pasture vegetation and fresh water diked marshlands; buttercup, common rush, bent grass, and fescue grasses dominate; use by small mammals and predators; amphibians and reptiles in diked marshlands.
Engineering Hydraulic pipeline dredging/disposal; DMD use will require water quality protection for Skipanon Slough, a pipeline crossing for Harbor Drive, and diking.
Environmental Concerns Loss of habitat and agricultural lands.
Comments At least the western portion could be used for future DMD use.
(cf 42.05, 57.40, 57.50)

25(S) - Shoreland **Priority 1** (reevaluate boundaries)

Location North of Harbor Drive; bisected by King Avenue; in Warrenton.
Size 130 acres
Capacity 2,080,000 cy at 10 feet
Ownership Port of Astoria
Designation *Water Dependent Development*
Current Use Limited industrial, residential and agriculture
Final Use Industrial
Related Projects Warrenton Boat/Turning Basin maintenance and expansion; 20' channel above bridge; Skipanon inner channel; Warrenton Lumber Company development.
Bio-Physical Description The upland areas and diked marshlands of the Pacific Fabricators' site west of Holbrook Slough; generally low; sand fill material and diked tidal marsh; adjacent to the Skipanon Channel; drains into Skipanon Peninsula directly and into Youngs Bay through Holbrook Slough; upland pastures with sandy soils supporting grass, clover, and other herbaceous species; diked marshland contains common rush, buttercup, bent grass, etc.; use by amphibians, reptiles, birds; supports a population of short-eared owls and marsh hawks.
Engineering Hydraulic pipeline or bucket dredging/disposal; requires berming to protect Holbrook Slough; overflow weirs; existing dikes should contain DM.
Environmental Concerns Minimal habitat loss; need to protect water quality and riparian vegetation along Holbrook Slough.
(cf 42.06, 57.40, 57.50)

26(S) - Shoreland **Priority 3**

Location North of Oregon Coast Highway, west of Youngs Bay Plaza, east of Marlin Avenue, south of Harbor Drive, in Warrenton.
Size 13 acres
Capacity 208,000 cy at 10 feet
Ownership Private
Designation *Development*
Current Use Agriculture
Final Use Commercial
Related Projects Skipanon inner channel; Warrenton Boat/Turning Basin maintenance and expansion; 20' channel above bridge; Warrenton Lumber Company development.
Bio-Physical Description Flat diked pasture with silty clay loam soils; some surface drainage in the north; pasture land with bent grass, fescue, etc., some common rush and herbaceous plants; alder and elderberry shrubs occur on southern portion; use by birds and small mammals.
Engineering Hydraulic pipeline dredging/disposal; requires berming, diking, and effluent weirs.
Environmental Concerns Minimal impacts expected if Holbrook Slough is protected from effluents; isolated pastureland surrounded by development with minimal habitat value.
Comments DMD use should be coordinated with rehabilitation plan to allow settling time prior to commercial development and to ensure that the final height is appropriate.
(cf 42.05, 57.40, 57.50)

27(S) - Shoreland **Priority 3**

Location South of Oregon Coast Highway, west of Holbrook Slough, in Warrenton.
Size 9 acres
Capacity 144,000 cy at 10 feet
Ownership Private
Designation *Development*
Current Use Agriculture
Final Use Commercial
Related Projects Skipanon inner channel; Warrenton Boat/Turning Basin maintenance and expansion; 20' channel above bridge; Warrenton Lumber Company development.
Bio-Physical Description Low, flat, with silty clay soils; drained by a small slough into Holbrook Slough; diked marsh dominated by common rush, bent grass, fescue, buttercup, etc.; use by small mammals, reptiles, amphibians, and birds.
Engineering Hydraulic pipeline dredging/disposal; requires berming and weir construction for effluent discharge; pipeline would cross both Harbor Drive and the Oregon Coast Highway.
Environmental Concerns Habitat loss; minimal water quality impacts because Holbrook Slough is a highly manipulated waterway; appropriate diking and weir development can control sediment.
Comments This site is a low priority because the multiple highway crossings make DMD use expensive. Fill for development of this area could be brought in from sources other than dredging.
(cf 42.08, 57.40, 57.50)

28(S) - Shoreland **Priority 3**

Location Southwestern portion of Clatsop County Airport
Size 28 acres
Capacity 448,000 cy at 10 feet
Ownership Port of Astoria
Designation *Development*
Current Use Agriculture/shrub
Final Use Airport related development
Bio-Physical Description Diked pastureland; pasture species of grasses, clover, etc.; supports small mammal and bird populations.
Engineering Dredging/disposal problematic: hydraulic pipeline with booster pumps and perhaps barging bucket dredged material (5 mile round trip); requires berming; very expensive to place materials here.
Environmental Concerns Loss of pastureland.
Comments Use for maintenance DMD is not practical. This site would be appropriate for DM stockpile for dike maintenance. Site is adjacent to the Astoria Highway and would allow access by trucks throughout the lowland areas of the Lewis and Clark Valley.
(cf 42.08)

29(S) - Shoreland **Priority 3**

Location Northwest portion of Clatsop County Airport
Size 40 acres
Capacity 640,000 cy at 10 feet
Ownership Port of Astoria
Designation *Development Shoreland*
Current Use Agriculture/shrub
Final Use Airport related development
Bio-Physical Description Western and southern areas are pastureland; northern and eastern areas are lowland; surrounded by dikes; drainage channel along northern dike into Youngs Bay; lowland portion if shrubbery of willow, Scotch broom, and small alder and grasses; supports populations of deer, terrestrial furbearers, small mammals, and birds.
Engineering Dredging/disposal problematic: hydraulic pipeline with booster pumps or 5 mile round trip barging bucket dredged material; requires berming, and clearing of northern and eastern portions.
Environmental Concerns Loss of deer, terrestrial furbearer, small mammal, and bird habitats; some loss of pastureland.
Comments As in Site 28(S), the major problems are economic. It will be very expensive to place dredged materials here. DMD use from maintenance dredging is not practical.
(cf 42.08)

65. POTENTIAL RESTORATION/RESOURCE ENHANCEMENT PROJECTS

MARSH RESTORATION — CREATION SITES

6 (M) — MARSH CREATION

Site Description

Location: Swash Lake/Trestle Bay, south of Clatsop Spit at the river mouth

Size: 1 - 20 acres

Biophysical Characteristics: Accreted shoreland area continguous to the tidal marshes of Trestle Bay and Swash Lake; consists of stabilized sand dunes which provide a rolling landscape. Area at one time was a sandy beach at the river mouth; the dunes were built up after construction of the south jetty. Vegetation is primarily coast pine, scotchbroom, salal and other low shrubs and ground covers, such as wild strawberry. The dune area gets substantial use by wildlife, including deer, raptors and other birds, small mammals and reptiles.

Land Use - Plan Designation: Area is part of Fort Stevens State Park; designated ***Conservation Shoreland*** in CREST/County plan for recreation uses.

Ownership: Federal (Corps of Engineers) - leased to the State of Oregon.

Restoration Action

Expand the size of the Swash Lake/Trestle Bay marshes by excavating the adjacent sand dunes to the intertidal level, opening up drainage channels into existing marsh channels. Plant native marsh plants or allow natural marsh colonization of the area. Excavate dune material used to fill in dune troughs and stabilize with beach grass and scotchbroom. One or more marsh areas of variable size could be created at this general location.

Biological Potential/Impacts

Lowering the dune area to the intertidal level and constructing drainage sloughs will likely allow colonization of flora and fauna found in adjacent areas of similar elevation and topography. These are ecologically important areas. The adjacent tidal marsh has been extensively studied. It grades from a low sandy marsh to a high mature marsh. Sedges, bullrushes, arrowgrass, bentgrass, silverweed and some low-salinity tolerant species are found in this essentially freshwater marsh. The biology of the sloughs and drainage channels has not been studied, but the area would be expected to have high numbers of benthic invertebrates and receive extensive use by many varieties of fishes.

These tidal marshes and adjacent flats and sloughs get extensive use by waterfowl and other wildlife; any new marsh area created should proportionately increase its potential to support wildlife. Considering the extent of protected dune habitat to the south, loss of terrestrial area natural values is probably small in comparison to potential aquatic habitat gains.

9 (M) — MARSH RESTORATION

Site Description

Location: Warrenton, on Youngs Bay, east of prcposed Pacific Fabricators site, west of Holbrook Slough

Size: 67.6 acres (7.6 acres of slough)

Biophysical Characteristics: Diked marshland in the 7'-9' range above MLLW, with a network of drainage sloughs which empty into Holbrook Slough. Salinity of adjacent estuarine waters ranges from 0 - 10 °/oo, the tidal range is 8.6' and annual submergence time is 2190 acre-days. Vegetation is mixture of posture grasses and tussock. The area gets some use by cattle, small mammals and foraging birds. Wildlife value is low.

Land Use - Plan Designation: Area is designated as ***Water Dependent Development Shoreland*** and also as a potential dredged material disposal site. The site should be reserved for either DMD use or as a restoration site. Use for either will require evaluation of the competing use.

Ownership: Port of Astoria

Restoration Action

Construct 2000 feet of new dike adjacent to railroad and on northwest side of Holbrook Slough. After appropriate stabilizing period, breach existing dike at 200' intervals and completely open existing drainage channels out to open water of Youngs Bay. Approximate restoration cost would be $350,000, exclusive of land value.

Biological Potential/Impacts

Based on proximity to proposed Youngs Bay development sites, tidal exposure, salinity and the protected location, it is expected that a highly productive brackish water tidal marsh will develop, and include sedges (*Carex* sp.) bulrushes (Scirpus spp.) and cattail (Typla sp.) plus other wetland vegetative species. Wildlife use by waterfowl, shorebirds and waders, and aquatic furbearers would increase significantly. The open slough area created would likely have very high benthic productivity, similar to adjacent Youngs Bay tidal flats. Fish usage, including juvenile salmon, is also expected to be high.

10 (M) — MARSH CREATION

Site Description

Location: Warrenton, on Youngs Bay, southeast of Holbrook Slough

Size: 4.25 acres of slough and 15.3 acres of land - total 19.55 acres

Biophysical Characteristics: Diked marshland in the 8' - 9' range above MLLW. Drained by Holbrook Slough. Salinity of adjacent estuarine waters ranges from 0 - 10 °/oo, tidal range is 8.6' and annual submergence time is 219 acre-days. Area is presently used to grow hay and gets extensive use by small mammals. Use by other wildlife is low to moderate. Warm water fishes are found in Holbrook Slough.

Land Use - Plan Designation: Area in agriculture use and designated ***Development Shoreland.***

Ownership: Port of Astoria

Restoration Action

Construct 1500 feet of new dike adjacent to railroad and U.S. Highway 101. Breach dike and open Holbrook Slough to Youngs Bay. Approximate cost of restoration would be $225,000.

Biological Potential/Impacts

A marsh intermediate between a high transition marsh and cattail-bulrush marsh could be created, including common rush (*Juncus effusus*), a variety of grasses and herbaceous plants, cattail, bulrush and sedge. Wildlife use by waterfowl, small mammals, aquatic furbearers, wading birds and shorebirds would increase significantly. Holbrook Slough would likely have high benthic productivity and receive significant use by fish.

12 (M) — MARSH RESTORATION

Site Description

Location: Lewis and Clark River - south of Fort Clatsop National Memorial.

Size: 27 acres low; 16 acres high, 3 acres drainage slough

Biophysical Characteristics: Diked freshwater tidal marsh, a 16-acre portion higher of which is used for grazing farm animals; remainder has partly reverted to a freshwater marsh. There is little intrusion of salt water in this reach of the river, even during low flows. The diurnal tidal range is 8.7 feet and the annual submergence time is about 2858 acre-days for the lower north portion and 350 acre-days for the higher south portion. The area is separated from the river by a road and has a single tidegate for drainage.